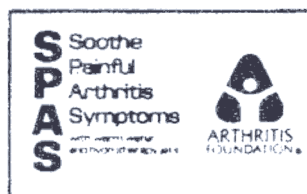


# IMPORTANT SAFETY INSTRUCTIONS



## INSTALLATION AND OPERATING INSTRUCTIONS



**READ AND FOLLOW ALL INSTRUCTIONS**

**SAVE THESE INSTRUCTIONS**

**THESE INSTRUCTIONS MUST GO TO THE  
END USER OF THIS EQUIPMENT.**

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## GENERAL INFORMATION

### 1.1 REQUIRED INSTRUCTIONS U.L. No. 1563

#### OWNERS MANUAL FOR ALL U.L. LISTED VITA SPA LX and DX SERIES SYSTEMS

**READ AND FOLLOW ALL INSTRUCTIONS  
BEFORE OPERATING THE SPA!**

1. Connect only to a grounded, grounding type receptacle.
2. A pressure wire connector is provided on the power box located inside the equipment access door, to permit connection of a bonding wire between this point and any metal equipment, metal enclosure of electrical equipment, metal water pipe or conduit within five feet of the spa as needed to comply with local requirements. Bonding wire must be at least a No. 8 AWG 98.4 (2mm<sup>2</sup>) solid copper wire.
3. Ground Fault Circuit Interrupter: This equipment is provided with a Ground Fault Circuit Interrupter on the equipment pack inside the access door. After the spa is filled and before use of your spa, with the plug connected to the power, push the "test" button on the ground fault interrupter, the power indicator light located under the GFCI should turn "off". Push the "reset" button. When the "reset" button is pressed, the power indicator light should turn "on". If the interrupter fails to operate in this manner, there is a ground current flowing, indicating the possibility of an electrical shock. Disconnect the plug from the receptacle until the source of the breakdown has been identified and corrected.
4. Installation: The spa must be installed in such a manner as to provide drainage of the compartment for electrical components. You need to pick a hard, flat and reasonably level surface. When properly installed, both skirt and tub will rest flat on the supporting surface. Failure to do this can cause the skirt to buckle or the tub to tilt and the side to distort. We recommend a poured concrete pad or similar hard surface.
5. Supplying Power to the Spa: After you have selected your level surface and have placed the spa in the position you desire, be sure the power cord provided will reach your grounding receptacle. The spa comes with a heavy duty cord (No. 12 wire) and is designed to plug into a 120 volt, 20 ampere, dedicated circuit, (to the

spa only). Should this cord fail to reach the service, it shall become necessary to have an electrician run a special No. 12 wire, 20 ampere service to reach this power cord. Do not use an extension cord! To do so will cause the spa to operate improperly, and will damage the pump, blower and possibly other equipment. Most important: **THE USE OF AN EXTENSION CORD WILL VOID ALL WARRANTIES!**

### 6 DANGER. RISK OF ELECTRICAL SHOCK.

Install at least 5 feet (1.52m) from all metal surfaces. Do not permit any electrical appliance such as a light, telephone, radio or television within 5 feet (1.52m) of a spa or hot tub.

### 1.2 SAFETY AND HEALTH INFORMATION

1. Always enter and exit spa slowly and cautiously. Wet surfaces will be slippery.
2. Never use a spa while under the influence of alcohol, anticoagulants, antihistamines, vasoconstrictors, vasodilators, stimulants, hypnotics, narcotics or tranquilizers.
3. Because of the ever increasing popularity of hot tubs and spas, more people of every age are discovering this new, total relaxing, and therapeutic activity. Everyone's body and circulation system is different, and responds to hot water immersion in different ways. For this reason the amount of time spent safely in your hot tub or spa will vary. Most people in good health find the temperature 100°F to be rewarding and limit themselves to soaks of between 10-20 minutes. Long exposure may result in nausea, dizziness or fainting. Before you use your hot tub or spa, it would be prudent to see your family doctor for recommendations regardless of your age, health, and medical history.
4. Pregnant women and persons suffering from heart disease, diabetes, high or low blood pressure should not enter the spa without prior medical consultation and permission from their doctor.
5. Unsupervised use by children should be prohibited.
6. Do not use the spa alone.

### 1.3.4 120 VOLT SYSTEM RESET

This reset is a general system reset to protect the 120 volt components of your spa. It is identified as "Breaker" on the control panel and is marked with a "20" designating maximum amperage the reset will hold. Should a short occur, this reset will automatically pop out, discontinuing electrical power to 120 volt circuitry. This reset must be manually reset once the problem has been resolved.

### 1.3.5 POWER INDICATOR LIGHT

This light located under the G.F.C.I. is ON when your spa is powered.

### 1.3.6 HIGH TEMPERATURE LIMIT RESET

This heat reset button is located on top of the heater housing and is identified as "Heater Reset". This button is designed to pop out in the event the water becomes too hot. If this occurs, the high limit reset will discontinue power to the electrical heating element. This reset button must be manually depressed to reset its function. This can only be done when the water has cooled down to about 80°F for the reset to hold. The high limit reset is designed to protect against overheating in the event the thermostat should fail to operate or in the unlikely event the heater should remain on without water flow.

## INSTALLATION INSTRUCTIONS

### 2.1 LOCATING YOUR SPA

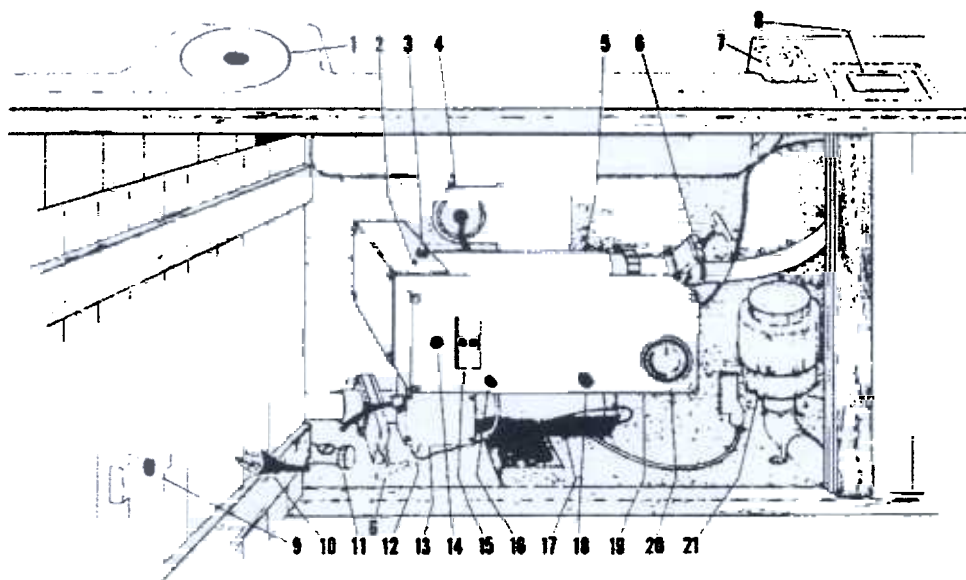
Your spa dealer is your best resource for determining how best to install your new Spa, what power requirements are necessary and what preliminary site preparation must be accomplished.

The spa must be installed in such a manner as to provide drainage away from the spa. Putting the spa in a depression could allow rain, overflow or other casual water to flood the equipment and create a wet condition for the spa to seat in.

The spa needs a hard, flat and level surface to rest on. When properly installed, the bottom of the spa will fit flush with the supporting surface. **FAILURE TO PROVIDE A FLAT SURFACE WILL CAUSE THE SPA TO DISTORT, COLLAPSE OR DAMAGE THE SKIRTING!** We recommend a poured concrete surface or similar hard surface.

Consider the following suggestions when selecting the ideal area for your Spa:

- a. Aesthetics — Select a location that enhances the overall environment of your home.



1. Filter
2. Heater Reset Light
3. Hi-Limit Reset
4. Spa Light
5. Heater
6. Push-Pull Gate Valve
7. Air Control Knob

8. Control Panel
9. Magnetic Door Interlock
10. Power Supply Cord (120V - 20A)
11. Drainage Hose Bib
12. Ground Lug
13. Power Box
14. 20A System Breaker

15. G.F.C.I.
16. Power Light
17. Pump
18. Magnetic Door Interlock
19. Control Enclosure
20. Time Clock
21. Air Blower

- b. **Local Codes** — Check local codes pertaining to fences, gates and electric prior to location of your spa.
- c. **Privacy and Wind Shielding** — A sheltered environment with less wind and weather exposure can result in lowered operation and maintenance costs. Also consider view or non-view from the house, proximity to change area and a pathway to and from your spa clear of debris and dirt so as not to track them into the spa.
- d. **Spa Maintenance** — Consider the spa closeness to trees and shrubbery; leaves and birds could create extra work in keeping your spa clean.

## 2.2 ELECTRICAL SERVICE

Spas equipped with LX or DX series equipment skid-packs can be installed with 120 or 240 volts. Note that 240 volt installation affects heater utilization only. Wired 120 volts, the heater draws 1.5 KW. Connected with 240 volts, the heater draws 6.0 KW. All remaining electrical components continue to operate on 120 volts protected by the 20 amperes system reset. (SEE SECTION 1.3.4).

In addition, your Spa has the unique design flexibility to be converted to either a 240 V, 30 A system or a 240 V, 50 A system. The basic differences between the three electrical systems are in the heater utilization. They are outlined as follows:

### HEATER

	120	240	240
Supply Voltage	120	240	240
Supply Amperage	20	30	50
Heater — KW	1.5	6.0	6.0
Pump Low Speed — ON	ON	ON	ON
Pump Jet (High) Speed — ON	OFF	OFF	ON
Air Blower — ON	OFF	OFF	OFF
Jet and Air Blower — ON	OFF	OFF	ON

All three systems perform very well. System selection depends upon personal preference, household amperage availability and geographic location.

Note that although connecting any of the three systems is easy, there are very important differences in how each one is done. **PLEASE, FOLLOW INSTRUCTIONS CAREFULLY. USE A QUALIFIED AND LICENSED ELECTRICIAN FOR 240 VOLT INSTALLATION.**

### 2.2.1 120 VOLT SYSTEM

120 Volt wired Portable Spas come with a 120 volt power cord. This cord contains heavy duty No. 12 wire and is designed to be the **ONLY** cord connection between the spa and the power supply. **NEVER** use an extension cord to bring power to the spa. Extension cords create resistance and will cause the spa equipment to operate on too low levels of voltage. This lower voltage will cause major damage to the electrical components in the spa and may void the warranty.

Use the supplied power cord to measure the distance to your electrical outlet. If the cord will not reach, you must either move the spa or have an electrician run a dedicated 120 volt, 20 ampere service to an acceptable proximity of the spa.

Please check your power outlet before installing the spa. This outlet must have a minimum of 120 volts and 20 amperes. In addition this power receptacle must be a dedicated service, meaning that no other outlets, appliances or devices can share the same circuit. Other appliances rob the circuit of the amperage necessary for the spa to operate properly. Also check that the circuit is properly grounded and that the receptacle is properly configured to accept the power plug. (SEE SECTION 1.3.1). In some areas, a ground fault interrupter may be required at the receptacle. Check your local building codes. If you have any doubts, have your circuit checked by a qualified and licensed electrician. Once the electrical inspection has been completed and any deficiency corrected, you are ready to move on to Section 3.1 "Getting your spa ready to use".

### 2.2.2 240 VOLT SYSTEM

Your Spa LX or DX series is designed to be easily converted from 120 volts to 240 volts. Please review section 2.2.

**HEATER CONVERSION FROM 120 TO 240 VOLTS REQUIRES SPECIFIC WIRING CHANGES THAT CAN BE PERFORMED ONLY BY YOUR DEALER OR LICENSED ELECTRICIAN.**

The following instructions are to be given to a licensed electrician for his use to run a 240 volt hard conduit service to your spa:

1. A DUAL COMMON TRIP (not two single) 30 or 50 amperes circuit breaker must be installed at the household circuit box, depending upon the heater

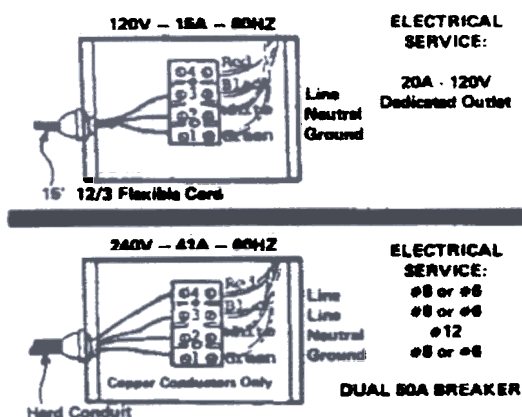
- utilization mode you have selected.
2. This service must be dedicated and used only to power your spa.
3. Four wires are to be pulled:

	SYSTEM	
Dual Circuit Breaker	30A	50A
2 Line voltage — Wire size No.	10	8
1 Ground — Wire Size No.	10	8
1 Neutral — Wire size No.	12	12

In no case should smaller than 10 gauge wire for 30A system or 8 gauge wire for 50A system be used and only then when the distance from the breaker box to the equipment is less than 50 feet.

4. The power box is set-up to receive 3/4" conduit and fittings.
5. Open power box. Make four wire connections to power terminal strip as per the instructions on the box cover. (SEE ILL. BELOW) Make conversion wiring changes as per the instructions outlined in "Heater Conversion Instruction", located in the back pocket of this manual.
6. Ground equipment to a permanent earth ground per applicable code.
7. **ALL ELECTRICAL CONNECTION MUST BE TO NEC (NATIONAL ELECTRIC CODE) AND TO ANY PERTINENT LOCAL ELECTRIC CODE STANDARDS.**

ILL. NO. 4



## OPERATING INSTRUCTIONS

### 3.1 GETTING YOUR SPA READY TO USE

With all electrical connections done you are now ready to fill-up your Spa.  
Please go through the following steps:

- STEP 1. **DO NOT PLUG** in 120 volt power cord. For 240VAC system, make sure breakers are OFF.
- STEP 2. Make sure ALL electrical power to equipment is in the OFF position.
- STEP 3. Make sure thermostat is rotated to the OFF position.
- STEP 4. Make sure the two 1½" gate valves located at the Pump inlet and the heater outlet are in the OPEN position. Lift up on T handle. **MAKE SURE ALL JETS ARE OPEN** (counter-clock wise).
- STEP 5. Make sure drain (hose-bib) valve is tightly closed.
- STEP 6. Using garden hose, fill spa with water to 4" of top of spa — **DO NOT** permit water line to drop below 5" from top of spa at anytime.
- STEP 7. Wait approximately 15 minutes and:
- STEP 8. Inspect spa water connections and perimeter for any leaks or puddles of water. If there are any leaks, call service for repair if the leak cannot be readily corrected, i.e.: connections, unions, etc.

### 3.2 STARTING YOUR SPA

- STEP 1. Plug power cord into 120 volt power receptacle. Make sure breaker is ON for 120 v or 240 v systems.
- STEP 2. Press "T" test button on GFCI and then "R" reset button to operate. Review section 1.3.2.
- STEP 3. **DX SERIES:**
  - Set timer for current time. Select running time and set timer selector switch to ON position as explained in section 3.3.3.
  - Close door. Spa will not function if the door is open.
  - Push selection button to function #1, low speed pump. (See Section 3.3.1)
- LX SERIES:** Press SYS button (SEE SECTION 3.4 "LX Feature and Functions"). Light will come on. Press jet button. let jet operate for one minute minimum. When the jets are noted to have steady stream the system is ready. If there is no jet flow after one minute, turn system off and repeat start-up procedure. (SECTION 3.2).
- STEP 4. **DX SERIES:** You have just put the timer selector switch to ON position. Low speed pump will remain constantly on. Set thermostat to desired setting. (See section 3.3.2) Once spa has reached the desired temperature, set timer selector switch to center position for automatic timer control. (See section 3.3.3)
- LX SERIES:** Press SYS button off. Turn thermostat counter clockwise to desired setting. Your spa will start to heat.



**STEP 5.** Cover your spa and it will maintain the pre-set temperature continuously, 24 hours a day.

Initial heat up time will vary depending on whether spa is configured 120 or 240 volts. Spas with covers will heat as follows:

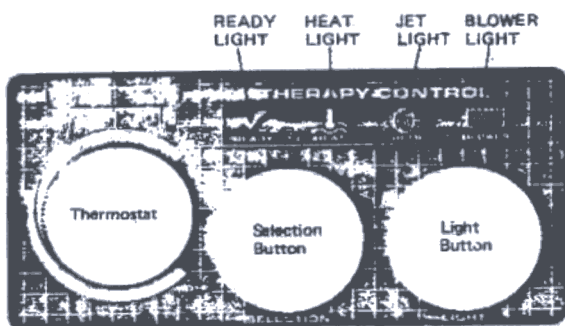
120 Volt spas heat 2° — 3° per hour with cover.

240 Volt spas heat 5° — 8° per hour with cover.

**STEP 6.** Add spa water chemicals. (See Spa Maintenance.).

### 3.3 FEATURES AND FUNCTIONS — DX SERIES

#### 3.3.1 FOUR FUNCTION AIR SWITCH THERAPY CONTROL PANEL



DX Series spas are equipped with a Therapy Control Panel as shown above. Each depression of the Selection button changes the operation of the equipment in the following sequence:

1. **Low Speed Pump:** READY indicator light is ON if pump low speed is on and the heater is OFF. HEAT indicator light is ON if heater is ON.
2. **High Speed Pump (JET) and Blower:** JET and BLOWER indicator lights are ON. On 220V installation only, HEAT indicator light is on when the heater is on.
3. **High Speed Pump (JET):** JET indicator is ON. On 220V installation only, HEAT indicator light is on when the heater is on.
4. **Blower only:** BLOWER indicator light is ON.

Function 1 is controlled by the timer and the timer selector switch. (See section 3.3.3) Functions 2, 3 and 4 can be accessed directly by depressing the Selection switch. These functions are NOT affected by the timer operation.

LIGHT button turns the light ON and OFF.

ALWAYS sequence back the equipment to function 1 after spa use. The timer will turn the pump on and off at selected times. The heater will maintain the desired water temperature while the pump low speed is on.

#### 3.3.2 THERMOSTAT SETTING

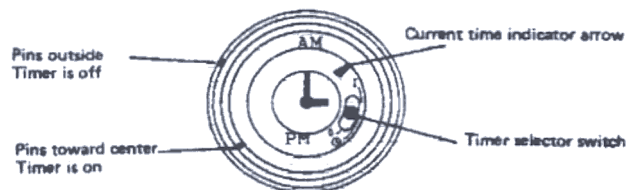
The thermostat is located on left side of the control Panel. Turn thermostat clockwise to desired setting. We recommend starting at 3/4 of knob rotation. Heater will turn on, and the spa will begin to heat. Heat indicator light located on Therapy Control Panel on when heater is on. (See Section 3.2 Step 4, 5 for initial heat up time.)

Check water temperature with a thermometer and adjust thermostat to desired temperature. Once you find the temperature you like best, identify its location on the panel. The heater will turn on and off maintaining the desired temperature during programmed time.

#### FREEZE PROTECTION:

Freeze protection is provided by setting the thermostat at an adequate temperature level. **IMPORTANT:** Time Selector Switch must be set "ON" to provide freezer protection (See Section 3.3.3).

#### 3.3.3 TIME CLOCK



The timer controls the pump low speed ONLY. ALL OTHER spa functions are accessible regardless of timer selector switch position, and regardless of timer being on or off.

#### TIMER SELECTION SWITCH

**OFF POSITION (UP):** Low speed pump is permanently off.

**TIMER CONTROL POSITION (CENTER):** Timer will start and stop pump low speed as selected.

**ON POSITION (DOWN):** Low speed pump is permanently ON. This position is used to initially heat the spa, or if the spa is going to be used on several occasions during an entire day.

#### SETTING TIMER

- a. Turn dial clockwise to set current time (AM or PM) by lining up the time indicator arrow and the current corresponding time on the dial.
- b. Each pin represents 15 minutes. Push pin toward center of dial to set desired running time.

### TIMER OPERATION

**ALWAYS** sequence your spa back to function No. 1 (heater-low speed pump) after spa use. Program timer 3 to 4 hours daily to maintain water filtration and desired temperature. Set timer to come for one hour before and one hour after your intended use, plus two additional hours. For instance, if you intend to use your spa between 6 and 8 p.m., set timer between 5 and 6 p.m. and between 9 and 10 p.m. Additionally, set timer for one hour at 9 a.m. and 2 p.m.

## 3.4 FEATURES AND FUNCTIONS – LX SERIES

### 3.4.1 SPA SIDE CONTROL

The spa side panel includes 4 ON/OFF buttons: SYS (low speed pump), JET (high speed pump), Acc #1 (blower), Acc #2 (light), an electronic thermostat and 2 indicator lights for SYSTEM and HEATER.

ILL. NO. 6



SPA SIDE CONTROL

#### SYSTEM BUTTON:

This button controls all 4 ON/OFF buttons. When it is off, the system light is OFF and none of the buttons will work.

It directly controls the low speed pump. Whenever it is on, the pump will run continuously, even if it is in the thermostat control mode until turned OFF by the "Automatic Equipment Protection" function. (See Section 3.4.3) The System always resets off following a power outage.

#### JET BUTTON:

Turns the pump from low to high speed and back. For systems with 120 volt heaters, the heater will turn OFF whenever this button is pushed. On 240 volt - 50A heated system, the heater will not be affected.

#### ACCESSORY #1 BUTTON:

Turns blower ON and OFF. This function interacts with heater the same way as the Jet button.

#### ACCESSORY #2 BUTTON:

Turns the light ON and OFF. It does not interact with heater.

#### SYSTEM INDICATOR LIGHT

Indicates that the system button has been pushed and the system is under manual control.

#### ELECTRONIC THERMOSTAT

Controls the temperature of the spa. Set thermostat to desired setting and water temperature and filtration will be maintained. Heater and low speed pump will turn on as needed on both 120v or 240v systems. FREEZE PROTECTION is provided by setting the thermostat at an adequate temperature level.

#### HEATER INDICATOR LIGHT

Indicates when the heater is ON regardless of pump mode or whether the pump is being operated manually, thermostatically or by the time clock. When the heater light is ON, the heater is ON, except if the Heater Reset Indicator Light is OFF. (See Section 3.4.4.)

### 3.4.2 TIME DELAY FUNCTION

A time delay is provided to keep the pump running for 25 seconds after the heater is turned OFF. This allows the heater element to cool down before the water flow is stopped.

### 3.4.3 AUTOMATIC EQUIPMENT PROTECTION

This function is electronically built-in and automatically turns off all manually activated equipment including the "SYS" function after the system has been turned on for 30-45 minutes. This function protects your equipment from running too long and saves on electric bills.

### 3.4.4 HEATER RESET INDICATOR LIGHT

This indicator light is located on top of the heater housing, next to the Heater Reset Button. It is used in conjunction with the "Heater Indicator Light" located on the Spa Side Control (See 3.4.1) to trouble shoot heater operation. (See Trouble Shooting Guide in the back pocket of this manual for further information.)

### 3.4.5 TIME CLOCK

#### SETTING TIMER

- a. Turn dial clockwise to correct time. Turning dial counterclockwise will damage timer switching mechanism and void warranty.



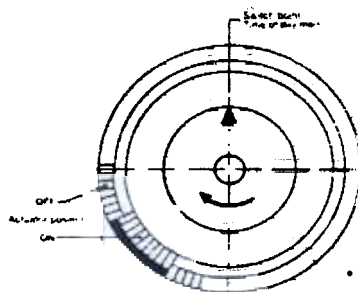
- b. Each switch activator represents 15 minutes. Push switch activator toward center of dial to set desired running time.

#### TIMER OPERATION

The timer controls the pump low speed. Its sole function is to provide added filtration when needed. The thermostatically controlled water temperature is not affected by the timer. When the timer is ON, the pump low speed comes on, as well as the heater if needed. When the timer is OFF, the pump low speed and heater still turn ON and OFF to maintain the water at the desired temperature. The timer provides only filtration time if the thermostat is turned all the way down.

The "SYS" button electronically overrides the timer. Just push "SYS", then "JET" or "BLOWER" buttons to enjoy your spa.

ILL. NO. 7



TIME CLOCK LX

### 3.5 JET ACTION

#### JETS.

Spas are provided with 3 types of therapy jets. **ADJUSTABLE JETS**, 3 to 5 per spa can be adjusted by turning the entire face of the jet counterclockwise to open and clockwise to close. The water stream is directional and massages one point of the body.

**MINI-SAGE JETS**, 2 to 3 per spa are not adjustable. Water stream has a swirling action which covers a 12" area of the body.

**DIVERTAJETS**, 1 to 2 per spa open clockwise and close counterclockwise by turning the entire face of the jet. When on, divertajets channel 100% of the pump output, creating a whirlpool / turbo action which in turn provides a motion massage on your entire body or part of it, depending on how close to the jet stream you choose to be.

Jets are located at proper heights to provide soothing massage on various parts of your body. Adjust jets as needed, but never close them completely.

**CAUTION: CLOSING COMPLETELY MORE THAN TWO JETS AT A TIME WILL RESTRICT YOUR SPA WATER FLOW AND MAY CAUSE THE HEATER AND PUMP TO OVERHEAT.**

Two air control knobs located next to your spa control panel control the amount of air intake into the jets. Jet pressure is at maximum level when air knobs are open. One turn is all that is necessary to fully open the air controls. No need to overtighten when closing. One air knob controls all regular jets. The second knob regulates the divertajet.

#### BLOWER

Your spa is equipped with the most efficient air injection system in the industry. Individual air injectors are strategically located to provide maximum therapy. When the blower is on, the injector cap unique "Shower Head" design creates thousands of tiny air bubbles. These bubbles burst through the warm water following your body contour and providing you with an overall soothing and relaxing massage.

### SPA MAINTENANCE

#### 4.1 GENERAL MAINTENANCE

##### 4.1.1 EQUIPMENT

Is located under the wood skirt. The G.F.C.I. should be tested before use of your spa. Any other servicing should be done by your dealer or other authorized personnel.

##### 4.1.2 COVER

Is an optional item for use with your spa, but is essential for proper temperature control and efficient operation. We strongly recommend to use a cover.

##### 4.1.3 CLEANING YOUR SPA

Use a liquid cleaner that contains no abrasives, e.g., 409, Fantastic, Spa Gloss — **DO NOT** use a cleanser or hard brushes.

##### 4.1.4. WINTERIZING

In areas of the country where the temperature goes below 32°, follow these steps.

**STEP 1.** If the spa is not to be used, drain completely and store in garage if possible. (See 4.1.5)

**STEP 2.** If you are going to use the spa, keep spa warm on thermostat control. **DO NOT TURN UNIT OFF** or frozen water may burst plumbing. (See Section 3.3.2 "Freeze Protection" and 3.4.1)

##### 4.1.5 DRAINING YOUR SPA

**STEP 1.** Unplug the spa.

**STEP** Attach garden hose to yellow hose bib located under the filter housing. Spa will empty by gravity. Siphon out balance of water. If you are draining your spa for the winter, go to Steps 3 and 4.

Remove water from pipe by disconnecting the 2 unions on the return line and on the pump suction. Turn off the water pump by unplugging the pump plug. Make sure no residual water is left. Re-install drain plug and unions.

**STEP** Store filter cartridge indoors and over the spa.

## 6 PUMP PRIMING/WATER LEVEL

The water pump is the heart of your spa and it is essential that the pump be operated correctly to prevent serious damage to your equipment. Therefore, knowing how to prime your pump and maintain the pump prime is very important. Pump priming or cavitations are characterized by the formation of air pockets at the inlet of the pump which in turn prevents the pump from pushing water through the heater. This condition can damage the pump or heater assembly. These air pockets are formed by:

Trapped air during initial filling. Refer to priming instructions. (Section 3.2)

Spa water level dropping too low. It is essential that water level be maintained at about 4" from the top of the spa. A low water level will cause the pump to suck air through the center of the filter cartridge.

3. Clogged Filter - This condition will also cause the pump to suck air through the center of the filter cartridge. (See "Filter Maintenance" Section 4.2)

No water jet action or jet stream "Sputters" with a "crackling" noise indicate cavitation or lack of pump prime.

**THESE CONDITIONS MUST BE CORRECTED IMMEDIATELY.**

## 4.2 FILTER CARTRIDGE MAINTENANCE

Every Vita Spa is designed with the most efficient top loading skimmer/filter system in the industry. A 50 square foot cartridge filters 100% of the water under both high and low speed functions.

Filter maintenance is the most critical factor in keeping your spa water clean. High

temperature accelerates the release of body oils and grease into the water. Water flow through the filter causes suspended particles and oils to become trapped on its fine polyester mesh surface. **BODY OILS CANNOT BE WASHED OFF WITH A GARDEN HOSE. OILS MUST BE DISSOLVED.** This is easily done by lifting the cartridge out of the housing and soaking it overnight into a 5-gallon pail of water with 1 cup of dishwasher detergent (Cascade for instance). The cartridge must then be rinsed **THOROUGHLY** and left to **dry** before using it again. A spare standby cartridge is an excellent investment. It provides convenience and assures that your filter will always be ready to operate at peak efficiency.

**HOW OFTEN:** Frequency of filter cleaning depends upon water chemistry, spa usage and spa location. Every 3 to 4 weeks may be sufficient. However, your cartridge needs to be cleaned if the water level in the center of the cartridge drops substantially in pump high speed. A clogged cartridge will cause air suction through the center of the cartridge and will cause the pump to cavitate. (See Section 4.1.6)

## 4.3 SPA WATER MAINTENANCE

### 4.3.1 CHEMICAL TREATMENT -Vs- FILTRATION

#### WARNING!

**NEVER USE ACID OR TRI-CHLOR. THEY RUIN ACRYLIC SPA FINISH.** If the PH level gets too high, simply empty the water and refill with fresh water.

The pleasure you derive from your spa is directly related to the quality of the water you have in it. There are two primary factors to consider in maintaining your spa and the quality of the water in it: one is chemical treatment, the other is proper filtration. Both are important.

**A WELL MAINTAINED FILTER HELPS YOU MAINTAIN YOUR SPA:** Before you consider chemical treatment of your spa, you have to consider your filter. Filters are necessary to remove particles of dust, dirt, algae, body oils, etc. that are continuously entering the water. If your filter doesn't operate correctly, or long enough (at least 3 hours daily) or isn't maintained properly, then it cannot remove these wastes from your spa. These

extra wastes put a burden on your chemicals causing extra expense you don't need.

Depending on spa usage, clean your filter every 4 weeks. (See Section 4.2) Change your spa water every 8 to 10 weeks.

**KNOW THE AMOUNT OF WATER IN YOUR SPA:** Refer to your Vita Spa brochure for spa gallonage.

**ALWAYS TEST THE WATER:** Testing is the only way to make sure the water is safe and comfortable. Tap water that's safe to drink may not be right for your spa. Mineral and metal imbalances can shorten the life of your spa and equipment. It is important that you have an accurate test kit for chlorine and/or bromine, pH and total alkalinity. One that also tests for calcium hardness is even more helpful.

Make these tests daily until user load is established, and then several times weekly to be sure proper levels are maintained. The regular use of your test kit will avoid costly guesswork and alert you to serious problems before they develop.

#### 4.3.2

**HOW TO TEST THE WATER:** Water testing is done by filling the test kit with a sample of spa water, adding drops of test solutions, and noticing color changes.

The accuracy of chemical tests is critical. To avoid errors:

- Run jets (without air) for a few minutes to mix water in the spa thoroughly before testing.
- Rinse test block with spa water before and after each test - never empty test block into the spa water after a test.
- Take water samples toward the center of the spa, at least twelve inches below the surface - do not take samples near the filter return lines.
- To obtain proper size, hold the test solution bottles vertically add drops slowly.
- Do not perform other tests when the free chlorine/bromine level is above average - conduct tests only when level drops - almost every test kit will bleach out and not give accurate readings.
- Do not use fingers to cover the larger test cell; as chemicals on skin can affect results.

- Read tests within 10 seconds after all test solutions are added.
- Make color comparisons in daylight, not under artificial light. Colors are easiest read in the shade, facing away from the light source, reading the test block against a white background.

Store the test kit away from sunlight and heat. Insure that test solutions are fresh; replace regularly.

Another significant factor is the ratio of bather load to gallonage and the amount of contaminants put into the water from each bather. Several clear advantages in the spa disinfection arise from the use of bromine when compared to the standard techniques of chlorine treatment.

- Disinfection efficiency with bromine is not significantly pH dependent in the pH range of 7.0 to 8.0.
- Bactericidal and viricidal efficiency of bromine is not reduced by the presence of ammonia and/or organic amines (i.e., perspiration, urine).
- Eye irritation and halogen odors are minimized by the use of bromine.
- When properly stored, bromine is very stable.

Following the initial hydrolysis of bromine, the remaining water chemistry is based upon Hypobromous Acid and Hypochlorous Acid. Hypobromous Acid reacts with ammonia to form a series of compounds called bromamines which are active disinfectants. Hypochlorous Acid liberated from bromine functions as a regenerated form of active bromine disinfectant thereby creating additional free bromine.

To sanitize always maintain a constant active bromine or chlorine residual of 2 to 4 ppm. To keep water clear, "shock" with chlorine to raise the inactive bromine back to the (HOBr) form. Chlorine is the most cost efficient method of oxidizing ammonia in water. Follow your chemical manufacturer instructions for proper chemical use and dosage.

#### 4.3.3 pH CONTROL:

pH can be described as a measure of the acid activity in water. It is important because it dictates the percentage of truly useful sanitizer that can be expected.

The overall importance of pH control is often underestimated. If pH is out of the desirable range it can adversely affect: (1) clarity of the

water; (2) bactericidal efficiency of the sanitizing agent; (3) odor of the water; (4) skin and eye irritation to the bather; (5) corrosiveness of the spa water; (6) scale formation on spa wall and piping (7) short filter cycles (8) deterioration of heaters.

The pH scale runs from 0 to 14, with 7.0 being the neutral or mid-point. Any pH less than 7.0 is on the acid side of the scale: the closer one comes to a pH of 0.0 the more corrosive the water. Any pH greater than 7.0 is on the basic or alkaline side of the scale; the closer one comes to a pH of 14.0 the more caustic the water. It is generally agreed that a pH in the range of 7.4 to 7.8 is the most comfortable and desirable level.

Adjusting the pH can be readily accomplished. The addition of pH up, which is sodium carbonate or soda ash will raise pH rapidly while raising alkalinity slowly.

#### 4.3.4 ALKALINITY:

Total alkalinity, as opposed to pH, is the quantitative measurement of the alkaline material, bicarbonates, hydroxides, etc. present in the water which acts as a buffer against rapid pH change. Spa water should be tested regularly to determine the total alkalinity which should be in the range of 90 to 120 ppm. - 90 being the ideal. To raise TA, use Sodium Bicarbonate (baking soda) which raises the alkalinity rapidly. It also will raise the pH slowly.

ACID OR TRI-CHLOR MUST NOT BE USED. IT WILL RUIN YOUR SPA FINISH.

#### 4.3.5 CALCIUM HARDNESS:

Total hardness is made up of dissolved calcium plus smaller quantities of other mineral salts including magnesium. It must be noted that the amount of calcium hardness present will vary from one spa to another and is what dictates water balance. The higher the calcium hardness level the lower total alkalinity; conversely the higher the TA the lower the calcium hardness one should maintain. Water will tend to balance itself by leaching calcium from whatever is available be it pool walls or your body. Try to maintain a higher calcium hardness level than the TA — ideally it should be 200 to 225 ppm.

#### 4.3.6 WATER CLARITY:

Because of the heavy demand on the water at elevated temperatures, your spa water may

appear to be cloudy. This indicates that your filter may be fouled and should be cleaned immediately. If after cleaning the filter, the water remains cloudy, check pH and TA. If cloudiness still persists, introduce water clarifier. This product is formulated to suspend particulate matter to form large enough particles to be trapped by your filter. Also you will use less chlorine or bromine because the water clarifier removes and neutralizes the particles before the chlorine or bromine has time to oxidize them.

If frequent dosages are indicated and the water continues to remain cloudy, you will need to drain and refill you spa.

#### 4.3.7 FOAMING:

Foaming is caused by shampoo and soap residues, hair sprays, cleansers and even "soft" water - low total alkalinity and calcium hardness. When air is bubbled through water, surface tension tends to create a film on top of the water which, in fact, does not allow the air bubbles to pop. These bubbles begin to form on the surface and have the appearance of foam.

In order to reduce the foam, the use of No Foam is recommended. This product immediately reduces surface tension by breaking down the oils and removing them through filtration. Squirt a small amount of No Foam across the surface of your spa water. If you find that it does not accomplish defoaming of the water within one hour, repeat the dosage. If several applications are required, this is an indication that the spa should be drained and refilled with fresh water.

#### 4.3.8 COLORED WATER/SCALE FORMATION:

Colored water is generally caused by the presence of metals such as iron, copper and manganese. They can be present as metallic ions in solution or as finely divided particles of metallic compounds in suspension. Each metal imparts its own characteristic color to the water when oxidized by chlorine or bromine. Iron produces a reddish brown tint. Copper causes the water to appear blue-green and when manganese is present, the water takes on a dark brownish black hue.

Because minerals and metals are generally present in the fill or make-up water, a proper chelating agent should be used to hold these minerals and metals in suspension to prevent scaling and corrosion.

Corrosion and scale formation result in decreased heater efficiency and, if left unchecked, may cause complete plugging of heater lines necessitating expensive replacements of heaters, pipes and metal fittings.

#### 4.3.9 ALGAE:

Algae are microscopic plants which can grow in a spa if the free chlorine or bromine readings drop too low. It can sneak up on you without you seeing it. Algae spores are always in the atmosphere and soil. Rain showers, winds and dust storms are constantly dumping these spores into your outside spa. Sunlight and warm temperatures provide the climate for algae to reproduce and grow — and grow. When you can see them you already have about 30 million algae per ounce of water.

The best way to take care of algae is to never let it appear. Diligent testing is a great preventative along with the use of an algicide. Treatment consists of superchlorination and an algicide application.

#### 4.3.10 ALTERNATIVE DISINFECTION METHODS

The spa industry is unique in that its end product, the spa, in its most basic definition, is a vessel which, when filled with water, heated to the recommended temperature for safe use, second, then allowing that water to move around a person's body, creates a pleasurable, therapeutic environment. Unfortunately, this same water becomes saturated with contaminants and bacteria.

Primarily, there are three methods of disinfecting the spa water. The first, and most widely used, is chlorine disinfection. Although powerful and effective, there are some adverse side effects: strong odor, limited life, strong irritant, very unstable. The second, bromine, although not as strong as chlorine, has minimal odor, is more stable, and is less of an irritant. The third alternative is ozone. Although it is 50% more powerful than chlorine and 90% more powerful than bromine, it has not been as popular as the first two disinfectants, due to its relatively new introduction in the market. However, it is fast becoming the recommended method of disinfection for the following reasons:

1. Disinfection takes place at a much higher oxidation level. In fact, there are **no bacteria or viruses that are resistant to ozone.**

2. Organic and inorganic contaminants are oxidized by ozone, then easily separated from the water through the filtration system.

3. Ozone is "most friendly" to the environment because, unlike chlorine, it introduces no forms of toxic or reactive by-products.

4. Ozone, unlike chlorine, leaves no foreign chemicals remaining in the water.

5. No by-products other than oxygen, carbon dioxide, and filterable remains are generated by using ozone.

**ENJOY YOUR SPA!**